

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

38. (currently amended) An automated storage and retrieval apparatus for storing containers at ultra low temperatures, said apparatus comprising:

 a freezer compartment, said freezer compartment having a side wall;

 a storage carousel disposed inside said freezer compartment for holding the containers;

 a climate-controlled chamber disposed on said side wall;

 a climate system for controlling the climate of said chamber;

 an interchange mechanism disposed inside said freezer compartment configured to:

 interchange a container between said interchange mechanism and said climate-controlled chamber while in a chamber exchange position,
 and

 interchange a container between said interchange mechanism and said carousel while in a carousel exchange position;

 said chamber being configured to:

 isolate the container from said interchange mechanism as container is deposited from the exterior or placed into the exterior, and

 isolate the container from the exterior as container is exchanged between said chamber and said interchange mechanism; and

 a translating mechanism disposed in said freezer compartment configured to align said interchange mechanism with at least one of:

 said carousel, and/or configured to align said interchange mechanism with
 at least a second one more carousel located in said freezer compartment.

39. (original) The apparatus of claim 38, wherein said translating mechanism comprises at least one of track device, wheel system, conveyor system, pulley system, suspension device, belt system, gear system, or robotic device.

40. (currently amended) An automated storage and retrieval apparatus for storing containers at ultra low temperatures, said apparatus comprising:

a freezer means for freezing the containers;

a storage means disposed inside said freezer means for holding the containers;

a chamber means for interchanging the containers between the exterior and said freezer means;

a climate system control means for controlling the climate of said chamber means;

an interchange means disposed inside said freezer compartment for:

interchanging a container between said interchange means and said chamber means while in a chamber exchange position, and

interchanging a container between said interchange means and said storage means while in a storage exchange position;

said chamber means for:

isolating the container from said interchange means as container is deposited from the exterior or placed into the exterior, and

isolating the container from the exterior as container is exchanged between said chamber means and said interchange means; and

a translating means disposed in said freezer means configured to align said interchange means with at least one of:

~~said storage means, and/or configured to align said interchange mechanism with~~

~~at least one more a second~~ storage means located in said freezer means.

41. (currently amended) An automated storage and retrieval apparatus for storing containers at ultra low temperatures, said apparatus comprising:

a freezer compartment, said freezer compartment having a side wall;

a storage device disposed inside said freezer compartment for holding the containers;

a climate-controlled chamber disposed on said side wall;

a climate system for controlling the climate of said chamber;

an interchange mechanism disposed inside said freezer compartment configured to:

interchange a container between said interchange mechanism and said climate-controlled chamber while in a chamber exchange position, and

interchange a container between said interchange mechanism and said storage device while in a device exchange position; and

said chamber being configured to:

isolate the container from said interchange mechanism as container is deposited from the exterior or placed into the exterior, and

isolate the container from the exterior as container is exchanged between said chamber and said interchange mechanism; and

a translating device disposed in said freezer compartment configured to align said interchange device with at least one of:

~~said storage device, and/or configured to align said interchange device with~~

~~at least one more~~ a second storage device located in said freezer compartment.

42. (currently amended) A method for automatically depositing and storing containers in a freezer compartment at ultra low temperatures, said method comprising:

providing a first carousel in said freezer compartment;

providing an interchange mechanism disposed inside said freezer compartment;

depositing a container into a climate-controlled chamber;

controlling the climate of said chamber while isolating said chamber for a predetermined time while the container remains in said chamber;

retrieving the container from said chamber to said freezer compartment with said

interchange mechanism while said chamber is isolated from the exterior, and

storing the container or any other container located in said first carousel and/or translating the container to at least one other carousel for storage also located in said freezer compartment.

43. (original) A method for automatically storing and retrieving containers in a freezer compartment at ultra low temperatures, said method comprising:

providing a first carousel in said freezer compartment;

providing an interchange mechanism disposed inside said freezer compartment;

providing a climate controlled chamber;

retrieving a stored container from said first carousel into said climate controlled chamber with said interchange mechanism, while said chamber is isolated from the exterior;

controlling the climate of said chamber while isolating said chamber for a

predetermined time while the container remains in said chamber; and

presenting the container for pickup while said chamber is isolated from said freezer compartment;

providing a second carousel in said freezer compartment;

retrieving a second stored container from said second carousel with said

interchange mechanism; and

translating said interchange mechanism with the second container therein.

44. (original) The method of claim 43, further comprising:

translating said interchange mechanism with the second container therein; and

transferring the second container from said interchange mechanism into said climate controlled chamber, while said chamber is isolated from the exterior.

45. (original) The method of claim 44, further comprising:

controlling the climate of said chamber while isolating said chamber for a predetermined time while the second container remains in said chamber; and presenting the second container for pickup while said chamber is isolated from said freezer compartment.

46. (original) The method of claim 44, further comprises: translating said interchange mechanism with the second container therein, wherein after translating said interchange mechanism, said method further comprises: transferring the second stored container from said interchange mechanism into to said first carousel or other carousel or storage device also located in said freezer compartment.

47. (New) The apparatus of claim 38, wherein said chamber further comprises: an exterior door, whereby said exterior door is adapted to allow the containers to interchange between said chamber and the exterior, and an interior door, whereby said interior door is adapted to allow the containers to interchange between said chamber and said interchange mechanism.

48. (New) The apparatus of claim 38, where said chamber further comprises: a transport tray slidably mounted to said chamber for transporting the container between an outer position closest to the exterior and an interior position closest to said interchange mechanism.

49. (New) The apparatus of claim 48, wherein said controlled chamber further comprises: a motor operably connected to said transport tray for translating said tray between the exterior position and interior position, and any position generally there between; and the said motor being disposed outside said freezer compartment.

50. (New) The apparatus of claim 38, wherein said climate system comprises a dry gas supply to dehumidify said chamber and cool said chamber.

51. (New) The apparatus of claim 38, wherein said chamber comprises a writing device.

52. (New) The apparatus of claim 38, wherein said chamber comprises a reading device to identify the containers as they are inserted into and retrieved from said chamber.

53. (New) The apparatus of claim 38, further comprising a control system, wherein said control system is operatively connected with said carousel, said interchange mechanism, and chamber for controlling their operations.

54. (New) The apparatus of claim 53, wherein said control system comprises a processor for processing data relative to the containers being stored in and retrieved from the apparatus.

55. (New) The apparatus of claim 53, wherein said control system comprises a processor for processing data relating to contents of the containers being stored in and retrieved from the apparatus.

56. (New) The apparatus of claim 53, further comprising a user station operatively connected to the apparatus, said user station comprising a data input means for inputting data to said processor relative to the containers.

57. (New) The apparatus of claim 38, wherein said interchange mechanism further comprises:

an interchange tray configured to retain the container.

58. (New) The apparatus of claim 57, wherein said interchange mechanism comprises:

a picking mechanism translating said interchange tray for interchanging the container with said carousel or said chamber.

59. (New) The apparatus of claim 57, wherein said interchange mechanism further comprises:

a vertical transporter configured to allow said interchange mechanism to be translated vertically over a plurality of discrete heights.

60. (New) The apparatus of claim 59, wherein said interchange mechanism further comprises:

a rotary transporter, said rotary transporter configured to rotate said interchange mechanism to a plurality of discrete circumferential positions.

61. (New) The apparatus of claim 60, wherein said circumferential positions include rotational alignment corresponding to a position at which the interchange mechanism can:

interchange selected containers with said climate-controlled chamber while in the chamber exchange position; and

interchange selected containers with said carousel while in the carousel exchange position.

62. (New) The apparatus of claim 60, further comprises:

a motor operably connected to said rotary transporter for rotating said interchange mechanism the plurality of discrete circumferential orientations; and
said motor being disposed outside said freezer compartment.

63. (New) The apparatus of claim 59, wherein said discrete heights include the heights corresponding to a height at which the interchange mechanism can:

interchange selected containers with said climate-controlled chamber while in the chamber exchange position; and

interchange selected containers with said carousel while in the carousel exchange position.

64. (New) The apparatus of claim 59, further comprises:
a motor operably connected to said vertical transporter for vertically translating
said interchange mechanism to discrete heights; and
said motor being disposed outside said freezer compartment.

65. (New) The apparatus of claim 57, further comprises:
a motor operably connected to said picking mechanism for substantially
horizontally translating said picking mechanism between an extended position for use
during the interchanging of the container, and a retracted position while the container
remains in the non-extended position; and
said motor being disposed outside said freezer compartment.

66. (New) The apparatus of claim 38, wherein said carousel further comprises an
annular ring of vertical racks arranged circumferentially.

67. (New) The apparatus of claim 66, wherein said carousel further comprises
storage trays to hold a plurality of storage containers.

68. The apparatus of claim 67, wherein said storage trays are adjustably mounted.

69. (New) The apparatus of claim 66, wherein said carousel further comprises an
upper horizontal top plate and a lower horizontal support plate.

70. (New) The apparatus of claim 66, wherein said carousel is rotatable so as to
align said vertical racks with said interchange mechanism.

71. (New) The apparatus of claim 66, wherein said carousel is stationary.

72. (New) The apparatus of claim 66, further comprising:
a motor operably connected to said carousel for rotating said carousel; and
said motor being disposed outside said freezer compartment.

73. (New) The apparatus of claim 38, further comprising:
at least one access portal disposed on said carousel.

74. (New) The apparatus of claim 73, wherein said at least one access portal is
adapted to allow selected containers to pass there through when said selected containers
are passed between said chamber and said interchange mechanism.

75. (New) The apparatus of claim 41, wherein said storage device is movable so
as to align said storage device with said interchange mechanism.

76. (New) The apparatus of claim 41, wherein said storage device is stationary.

77. (New) The apparatus of claim 41, further comprising:
at least one access portal disposed on said carousel.

78. (New) The apparatus of claim 77, wherein said at least one access portal is
adapted to allow selected containers to pass there through when said selected containers
are passed between said chamber and said interchange mechanism.

79. (New) The method of claim 43, wherein said presenting the container
comprises ejecting the container to the exterior for pickup.

80. (New) A method for automatically depositing and storing containers in a
freezer compartment at ultra low temperatures, said method comprising:
providing a first storage device in said freezer compartment;
providing an interchange mechanism disposed inside said freezer compartment;
depositing a container into a climate-controlled chamber;

controlling the climate of said chamber while isolating said chamber for a predetermined time while the container remains in said chamber;
retrieving the container from said chamber to said freezer compartment with said interchange mechanism while said chamber is isolated from the exterior,
and
storing the container or any other container located in said first storage device and/or translating the container to at least one other storage device for storage also located in said freezer compartment.

81. (New) A method for automatically storing and retrieving containers in a freezer compartment at ultra low temperatures, said method comprising:
providing a first storage device in said freezer compartment;
providing an interchange mechanism disposed inside said freezer compartment;
providing a climate controlled chamber;
retrieving a stored container from said first storage device into said climate controlled chamber with said interchange mechanism, while said chamber is isolated from the exterior;
controlling the climate of said chamber while isolating said chamber for a predetermined time while the container remains in said chamber; and
presenting the container for pickup while said chamber is isolated from said freezer compartment;
providing a second storage device in said freezer compartment;
retrieving a second stored container from said second storage device with said interchange mechanism; and
translating said interchange mechanism with the second container therein.

82. (New) The method of claim 81, wherein said presenting the container comprises ejecting the container to the exterior for pickup.

83. (New) The method of claim 81, further comprising:
translating said interchange mechanism with the second container therein; and

transferring the second container from said interchange mechanism into said climate controlled chamber, while said chamber is isolated from the exterior.

84. (New) The method of claim 83, further comprising:
controlling the climate of said chamber while isolating said chamber for a predetermined time while the second container remains in said chamber;
and
presenting the second container for pickup while said chamber is isolated from said freezer compartment.

85. (New) The method of claim 81, further comprises:
translating said interchange mechanism with the second container therein, wherein after translating said interchange mechanism, said method further comprises:
transferring the second stored container from said interchange mechanism into to said first storage device or other carousel or storage device also located in said freezer compartment.